World Journal of Science, Technology & Sustainable Development, Vol. 7, No. 3, 2010

DOES POVERTY CAUSE ENVIRONMENTAL DEGRADATION? – EVIDENCE FROM WASTE MANAGEMENT PRACTICES OF THE SQUATTER AND LOW-COST FLAT HOUSEHOLDS IN KUALA LUMPUR

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Abstract: This study examines whether or not the waste management practices of the poor households living in squatters and low-cost flats in Kuala Lumpur are conducive to the environment. With the aim of accomplishing the above, the study empirically assesses knowledge, attitude and behaviour of the urban poor concerning their household solid waste management. With primary data collected from the level of living condition and waste management practices of the urban poor, the study employed a multiplicity of statistical techniques such as t-tests of equality of means, one-way analysis of variance, chi-square 'likelihood ratio' tests, and descriptive statistics. The findings of the study provide evidence to the effect that poverty does not cause environmental degradation as the knowledge, attitude, and behaviour of the urban poor concerning solid waste management are found to have been conducive to the environment. The study suggests that the problems of poverty and environment need to be seen differently as the causal relationship between the two does actually depend on the level of socioeconomic profile and the type of environmental practices of a particular group of community.

Keywords: *Poverty, Environment, Solid Waste Management, Urban Poor, Kuala Lumpur City.*

INTRODUCTION

The actual relationship between poverty and environmental degradation is still unclear. Since the 1970s it has been almost universally agreed that poverty and environmental degradation are inextricably linked and thus the alleviation of poverty has been identified as the major prerequisite of any effective environmental policy. The World Commission on Environment and Development (1987) stated "Poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality". The linkages

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and interrelationships between poverty and environment were also seen to be self-enforcing. In this regard, the commission also stated "Many parts of the world are caught in a vicious downwards spiral: poor people are forced to overuse environmental resources to survive from day to day, and their impoverishment of their environment further impoverishes them, making their survival ever more difficult and uncertain". In fact, the dominant viewpoint on poverty and environment reflects this image of a vicious downward spiral of need in the developing countries. Most of the environmental degradation in developing countries is gradual and almost invisible. It is generally accepted that environmental degradation, rapid population growth, and stagnant production are closely linked with the fast spread of acute poverty in many countries of Asia (Jalal, 1993). The causes of urban environmental degradation lie largely at the management level (Hardoy et al., 1990).

However, the strong association between urban poverty and environment can also be explained in terms of waste management systems due to the fact that the urban poor usually live in underdeveloped areas where household waste collection and disposal services are believed to be non-existent. The squatters and low-cost flats can be worthwhile example of this type of underdeveloped areas. Since, most of these areas are not well laid out; many of the dwellings are inaccessible so that even if the urban authorities wanted to establish waste collection services, most households could not be reached. Consequently, it is very likely to assume that most urban poor households dispose of their household waste themselves around the immediate vicinity of their dwellings and such environmental practices cause massive neighbourhood environmental degradation.

The problem of solid waste management is still perceived as an unresolved problem experienced by the developing countries. In Malaysia, this problem has been greatly resolved by the appropriate actions and policies taken by the government engaging both the government and private sectors. But the environmental problems related to solid waste management systems amongst the squatters and low-cost flat dwellers in Kuala Lumpur city are more acute and thus they also require appropriate actions and policies to be taken by the respective authorities for resolving related environmental problems. The present study is an effort to investigate the poverty-environment hypothesis with regards to solid waste management of the urban poor residing in squatters and low-cost flats of Kuala Lumpur, since it is very often believed that the poor have a tendency to degrade the environment by practicing improper methods of environmental management systems.

LITERATURE REVIEW

There is still confusion over the link between poverty and environment. Some studies argued that poverty is the principal or only cause of environmental degradation, while findings of some other studies reveal that environmental degradation is the principal cause of poverty. Durning (1989) argued that a declining resource base directly contributes to further poverty, and so the process continues in a 'downward spiral'. Ramphal (1992) stated that poor people often destroy their own environment-not because they are ignorant, but to survive and they over-exploit thin soils, over-graze fragile grasslands, and cut down dwindling forest stocks for firewood. On the other hand, the findings of the study by Holmberg and Thompson (1991) contradicted this evidence, in which

causality appears to run the other way. This study reveals that poor people often manage their environment in sophisticated and sustainable ways, and poverty can serve to limit their impact on the environment. The study argued that increasing wealth can evidently lead to environmental degradation. Another study by Leach & Mearns (1995) concluded that poverty does not affect environment directly or environment is not the only cause of poverty. This study reveals that there are so many socio-economic, political, demographic, and management problems, and conditioning variables, which affect the linkages between poverty and environment.

The literature on poverty-environment hypothesis in urban areas is surprisingly thin, compared to the number of studies done in rural areas. The concrete empirical research on urban poverty and environment in Southeast Asia is very limited. Although few case studies on urban areas discuss particular progressing efforts, but many suggest hypotheses to be explored further and usually require further investigation. In fact, all the aspects of the poverty-environment nexus in urban areas make the search for a single causal relationship that postulates either poverty causes environmental degradation or environmental degradation causes poverty. Following are the reviews of some empirical studies those were conducted for exploring this causal relationship between poverty and environment.

Prakash, S. (1997) conducted a study in the state of Himachal Pradesh and the hill districts of Uttar Pradesh, India. Using both conceptual and empirical material, the study examined some of the major linkages that are believed to exist between the processes of poverty and environmental degradation. The study also examined whether the relationship between poverty and environment is functional or causal, and assessed the role of other factors, particularly institutions and social and cultural influences. The study revealed that environmental degradation is a negative externality whose causal roots, as well as solutions, lie in institutional and policy issues rather than in poverty itself. The study showed that poverty might have a lesser or more uncertain role in making environmental degradation. This is because the relationship between poverty and environment is mediated by institutional, socio-economic, and cultural factors and the degradation in areas of endemic poverty is more often caused by the effects of the mismanagement of macroeconomic, institutional, and other policies and factors. The study suggested that given improved management of such factors, poor communities can and will have excellent reasons to value the environment in both the short and the long-term. The study also suggested that environmental degradation could be minimized in areas of widespread poverty if accurate assessments of micro and macro level causes for degradation are made. Besides this, appropriate institutional measures must be taken to allow poor communities to enhance their resilience in the face of economic and environmental shocks and risks.

Mueller, C. C. (1993) conducted a study on the environmental degradation and urban poverty in Brazil. In this study, most of the urban poverty related problems and environmental degradation have been explained as a result of uneven economic development. The study revealed that congestion, inadequate sanitation, lack of freshwater supply, accumulation of household wastes, degradation of marginal lands together with the diseases and accidents are resulted from inadequate basic services, especially for those in the lower income brackets. The major deficiency found by the study in the poor urban settlements in Brazil is

that of facilities for the disposal of human excreta as the inadequate garbage removal services have caused major health and environmental problems. The study suggested that a considerable improvement in the urban environment and in living conditions could be achieved with investments in basic services.

Omuta, G.E.D. (1988) conducted a study in Sapele of Bendel State in Nigeria. The study examined the role of income levels on the links between poverty and urban environment. A total of 800 households were administered and income levels were examined from neighbourhood to neighbourhood. The study revealed that the level of household income is a major factor in determining the quality of the urban environment. The study also revealed that the relationship between poverty and environment is both direct and strong, and thus, low-income households tend to live under very oppressive environmental condition with subsequent social and health problems. In order to avoiding poverty related environmental problems, however, the study suggested that the poor should be educated to appreciate quality rather than quantity, and so should embrace the virtues of family planning as the ultimate key to urban environmental problems.

RESEARCH METHOD

The analysis of this study is based on primary data collected recently from three areas of squatter and low-cost flat in Kuala Lumpur. The squatters and low-cost flat households were chosen for the field survey. The overall sampling design for the study can be described as "stratified quota random sampling" with the key stratification variable "characteristics of household". In the first stage, the household to be surveyed had been selected purposively through a preliminary "windshield survey" in which the general characteristics of squatters or low-cost flat houses were found to exist. In order to do this, particular household types in each area were identified with the minimum interview-quota for each household-type. Then, to interject randomness into the sampling plan, interviews were made with every second or third home on a particular street. A total of 300 household heads were interviewed from three parliamentary areas of Kuala Lumpur within which 100 households were selected from each area following the ratio of sixty percent and forty percent for the squatters and low-cost flat dwellers respectively. All interviews were conducted by trained enumerators guided by a well-structured questionnaire.

The parliamentary areas that were chosen are Kepong, Segambut, and Titiwangsa and the respective squatter areas that have been surveyed are Jinjang Utara Tambahan, Sentul Pasar, and Datuk Keramat. Selection of these three areas for the study was based on the criteria that the poverty groups, which were observed to exist within the federal territory of Kuala Lumpur, are predominantly concentrated in the squatters and low-cost flats. Thus, to have the actual information on the poverty threshold, squatters and low-cost flat households were chosen as the potential respondents.

The study used descriptive statistics such as means, ranges, and frequency distributions for selected variables that were created for use in multivariate analysis. The statistical significance of three types of differences between and among variables was determined by three types of tests. For example, the significance of differences for continuous variables between pairs of means, by "t-tests of equality of means", and between more than two means such as differences

among the three areas, by one-way analysis-of-variance (ANOVA) tests. Besides, the significance of differences for discrete variables between and among observed and expected frequencies was examined by chi-square "likelihood ratio" tests.

RESULTS AND DISCUSSION

Householders' "Knowledge" Regarding Solid Waste Management and Related Matters

Households' Waste Collection Services

Most of the respondents (96.7 percent) know that household waste collection services are provided in their living areas. The knowledge of respondents regarding waste collection services differs significantly among areas ($P < 0.10$), with the highest number of those who know about it was reported in Jinjang Utara (100.0 percent), followed by 96.0 percent in Datuk Keramat and 94.0 percent in Sentul. Virtually all the respondents in Jinjang Utara know that a private waste contractor provides such services in their areas. Respondents' views on waste collection agencies differ significantly among areas ($P < 0.01$). For example, the vast majority of respondents in Sentul (98.9 percent) know that local town authority provides waste collection services in their areas. But, respondents' such views on the waste collection agency that is providing services in Sentul are not true. Because, both the squatters and low-cost flat houses in this area are serviced by a private waste collection agency. The reason behind not knowing about the actual waste collection agency in Sentul might be the lack of proper concern of respondents. Although the area of Datuk Keramat is serviced by a private waste contractor, only 60.0 percent of respondents of this area know this to be true. As many as 32.3 percent of Datuk Keramat respondents believe that local town authority provides their household waste collection services.

Frequency of Households' Waste Collection

Of all respondents interviewed, more than forty-four percent report that household waste collection services are provided three times per week. The response "every other day" was also considered equivalent with "three times a week". More than fifteen percent of respondents report that waste pick-up is not according to schedule and 13.8 percent do not know about the frequency. Only 21.0 percent of respondents indicated that their household wastes are picking-up every day. In fact, the "official" frequency of household waste pick-up in the three areas studied is "three times per week", and it is conceivable that the actual frequency differs from this. The answers of the respondents in this respect differ significantly and reflect the respondents' lack of knowledge. The knowledge of respondents concerning frequency of waste collection differs significantly among areas ($P < 0.01$), with Datuk Keramat respondents being most well informed (58.3 percent "correct" knowledge) and Jinjang Utara respondents being least well-informed (36.0 percent). In Jinjang Utara, as many as 31.0 percent of respondents indicated that waste pick-up is not according to schedule. In Sentul, 54.3 percent of respondents indicated that wastes are picking-up everyday, which is the highest frequency of this view in compare to another two areas (Datuk Keramat 10.4 percent and Jinjang Utara none).

Community Groups' Involvement in Waste Management

Nearly one-half (49.7 percent) of all respondents indicate that community groups

in their residential areas give attention to waste problems. The percentage differs significantly among areas ($P < 0.01$), with the percentage highest in Datuk Keramat (76.0 percent), followed by 73.0 percent in Sentul and no respondent reported such the view in Jinjang Utara. Of the 149 respondents indicating the existence of community groups giving attention to waste problems, the following percentages reported the following community groups to encourage such community actions: 66.4 percent local people, 37.6 percent neighbourhood security groups, 34.9 percent people's associations, 20.1 percent local town authority, 1.3 percent community centre, and 0.7 percent non governmental organizations (NGOs).

Of the 149 respondents indicating the existence of community groups giving attention to waste problems, the following percentages reported the following types of actions by the community groups: 94.0 percent indicated that they arrange community group action to clean the area, 40.9 percent present views concerning waste to local town authority or private waste contractors, 39.6 percent arrange a cleaning campaign in the area, 22.1 percent provide public dust-bins, 5.4 percent provide dust-bins to individual houses, and 0.7 percent for each of the actions such as arrange or encourage a recycling program in the area, have a representative in local town authority, and don't know.

"Source Reduction" of Waste Materials

More than forty-one percent of all respondents reported that they have heard about "source-reduction" of waste, that means, measures taken by agencies and individuals to keep waste from entering the waste stream (in contrast with "recycling" which is finding a benign use for waste that enters the waste stream). Percentages of such respondents differ significantly among areas ($P < 0.01$), with the highest in Datuk Keramat (75.0 percent), followed by 37.0 percent in Jinjang Utara and 13.0 percent in Sentul. By far the most common sources of information about "source-reduction" of waste for all respondents collectively are television (95.2 percent of respondents who have heard about "source-reduction" of waste) and newspapers (91.2 percent), followed by "other sources" (9.6 percent), local town authority (7.2 percent), and private waste contractor (5.6 percent). The most important information sources in Jinjang Utara are television (100.0 percent) and newspapers (83.8 percent). Most important sources in Sentul are newspapers (84.6 percent) and television (76.9 percent). In Datuk Keramat, both the information sources of television and newspapers are most important with the same percentage (96.0 percent each).

Method of Source Reduction

Ninety-six percent of respondents, who have heard about "source-reduction" of waste, indicate the most important method of achieving such "source-reduction" is through reusing waste materials that would otherwise be disposed. The second method followed as means for source reduction include: repairing things that are damaged and reusing them (85.6 percent); when buying something, considering whether its package can be reused (70.4 percent); when buying something, considering possibilities for reusing the product (63.2 percent); and when buying something, considering the amount of packaging included with the product (52.0 percent). The third include: considering the durability of the product, when buying something (50.4 percent); and when buying something, considering whether the product is made from renewable resources (42.4 percent). All the methods of source

reduction differ significantly among areas ($P < 0.01$, except for the first method, which is significant at "$P < 0.10$" level).

Suggestions for Reducing the Sources of Waste

More than ninety-six percent of respondents, who have heard about "source-reduction" of waste, have suggestions for their respective local town authority to encourage others to "source-reduce" waste. The most commonly offered suggestion is undertaking a waste "source-reduction" campaign (74.4 percent), followed by providing information concerning possible ways to "source-reduce" waste (71.9 percent) and providing information on reasons underlying a waste "source-reduction" program (67.8 percent).

Householders' "Attitude" Toward Solid Waste and Related Matters

Satisfaction with Waste Collection and Disposal Services

Of the all respondents interviewed, 47.4 percent indicated that they are "satisfied" and 5.8 percent "very satisfied" with the waste situation in their residential areas. On the other hand, 37.5 percent indicated that they are "dissatisfied" and 9.2 percent "very dissatisfied" with local waste conditions. Differences in householders' views on local waste condition differ significantly among areas ($P < 0.01$), with highest dissatisfied householders were reported in Jinjang Utara (83.0 percent), followed by 22.9 percent in Datuk Keramat and only 5.2 percent in Sentul. On the other hand, the highest number of satisfied householders was reported in Sentul (89.2 percent), followed by 54.2 percent in Datuk Keramat, and no householder was reported in Jinjang Utara, who is satisfied with local waste conditions. The highest number of very satisfied householders was reported in Datuk Keramat (15.6 percent) and no householder in Jinjang Utara reported such view. The highest number of very dissatisfied householders was reported in Jinjang Utara (17.0 percent) and lowest in Sentul (3.1 percent).

Sources of Dissatisfaction with Local Waste Conditions

Of the 137 respondents who are either "dissatisfied" or "very dissatisfied" with local waste conditions, the two problems with the same highest perceived percentages are "areas around public dust-bins are dirty" and "dogs, cats, and/or big rats search for food in the waste" (93.8 percent). Differences among areas in the number of perceived percentages of the above-mentioned problems are also statistically significant at the same level ($P < 0.01$). The other fourteen possible sources of dissatisfaction with local waste conditions, to which respondents reacted, have been summarized in Table 1.

Reasons for Households Recycling

The most common reason for households recycling is to "receive payment for materials recycled". The relative importance of this reason differs significantly among areas ($P < 0.01$), with the greatest importance in Jinjang Utara and the least importance in Datuk Keramat. The other thirteen reasons for recycling, to which respondents reacted, have been summarized in Table 2.

Reasons for Households Not Recycling

The most common reasons for households not recycling are "don't have enough time to sort, save, and transport materials" (76.9 percent) and "don't have enough room in my home to store materials" (73.6 percent). For both the reasons, percentages of respondents differ significantly among areas ($P < 0.01$), with the percentages for the first

Table 1 Percentages of "Yes" Responses of Respondents to Possible Waste Collection Problems within Individual Areas.

Waste Collection Problem	*Jinjang Utara*	*Sentul*	*Datuk Keramat*	*Total*
	Percentage			
People in this area dispose of waste everywhere	87.0	90.9	93.9	88.9 ^{NS}
When waste collectors collect waste, they don't collect all the waste	30.0	63.6	84.8	45.1 ***
Too infrequent collection of waste	80.0	54.5	87.9	79.9 *
Time of waste collection is not fixed	89.0	54.5	87.9	86.1 ***
No dust-bins for my waste	100.0	45.5	42.4	82.6 ***
Dust-bins provided too small	46.0	45.5	84.8	54.9 ***
Dust-bins supplied not covered	50.0	54.5	75.8	56.3 **
Public dust-bins are too far from my house	83.0	72.7	60.6	77.1 **
Areas around public dust-bins are dirty	100.0	54.5	87.9	93.8 ***
No way to dispose of bulky waste, e.g., furniture, refrigerators	52.0	45.5	84.8	59.0 ***
Dogs, cats, and/or big rats search for food in the waste	100.0	63.6	84.8	93.8 ***
Mosquitoes or flies are attracted to waste	100.0	54.5	81.8	92.4 ***
Street cleansing services are not good	67.0	72.7	39.4	61.1 **
Drainage cleaning services are not good	99.0	81.8	57.6	88.2 ***
Waste compactor lorries come here too often	18.0	36.4	12.1	18.1 ***

Note:

1. No respondent reported "other reasons" to possible waste collection problems.
2. *** Indicates significant difference among areas at 0.01 level.
3. ** Indicates significant difference among areas at 0.05 level.
4. * Indicates significant difference among areas at 0.10 level.
5. ^{NS} Indicates not significant at 0.10 level.

reason being highest in Jinjang Utara and lowest in Sentul and for the second reason being highest in Datuk Keramat and lowest in Sentul. The other eight possible reasons for households not recycling have been summarized in Table 3.

Motivations for Households to Recycle

The empirical results of this study reveal that recyclers are significantly more strongly motivated by personal than social reasons to recycle (Table 4). This result is supported in that the "personal reasons means" of 2.01 in Squatters, 2.47 in Low-cost Flats, and 2.18 for all householders collectively in the two groups of communities are significantly greater than the respective "social reasons means" of 1.83, 2.23, and 1.97 for the two communities individually and collectively ($P < 0.05$). The mean scores are significantly greater for low-cost flat dwellers than the squatter householders for the "personal reasons means" (2.47 versus 2.01) ($P < 0.05$) and "social reasons means" (2.23 versus 1.83) ($P < 0.01$). In all instances in which mean scores for individual reasons differ significantly between squatters and low-cost flats ($P < 0.01$), mean scores are greater for low-cost flats, except for the reason namely, "reduce total amount of waste that has to be burned or placed in sanitary landfills (dumpsites)", which is significant at "$P < 0.05$" level and greater for squatters

Table 2 Reasons for Households Choose to Collect and Recycle Waste Materials.

Possible Reason[a]	*Jinjang Utara*	*Sentul*	*Datuk Keramat*	*Total*
	Mean Score[b]			
Protect the environment	1.62	2.00	3.70	1.88 ***
Protect human health	1.82	1.57	3.70	1.92 ***
Avoid waste	2.33	2.50	3.30	2.45 NS
Improve appearance of my area	1.75	1.43	3.50	1.82 ***
I feel good because I have done something to improve my community/the environment	1.63	1.43	2.90	1.69 **
Save resources	3.36	1.71	2.00	2.86 ***
Reduce total amount of waste that has to be burned or placed in dumpsites	2.30	3.07	3.50	2.58 **
My religion tells us to use resources carefully	1.07	1.43	3.80	1.39 ***
Encouragement from family members	2.22	1.32	1.90	1.98 **
Reduce costs of waste collection and disposal	1.70	1.79	2.60	1.80 NS
Social pressure from family members	1.58	1.18	1.70	1.50 NS
Receive payment for materials recycled	4.89	4.25	4.10	4.67 ***
Social pressure from Neighbours	1.14	1.11	1.40	1.15 NS
Encouragement from Neighbours	1.14	1.11	1.40	1.15 NS

Note:

1. [a] Indicates that no respondent reported any "other reasons" for which he/she collects and recycles waste materials.
2. [b] Indicates mean scores of relative importance, where 1 = Not very important, 2 = Not important, 3 = Medium important, 4 = Important and, 5 = Very important.
3. *** Indicates significant difference among means at 0.01 level.
4. ** Indicates significant difference among means at 0.05 level.
5. NS Indicates not significant at 0.10 level.

than the low-cost flats (2.86 versus 2.09). The mean scores for individual reasons for recycling are significant at "$P < 0.01$" level and also greater for low-cost flat dwellers, which have been summarized in Table 4.

Table 4 shows that there is a stronger motivation by householders in Low-cost Flats to recycle waste materials than those in Squatters. But, in the extent of economic gain of recycling, mean scores for both communities do not differ significantly ($P \geq 0.10$). That means, the economic reasons mainly lead householders to recycle waste materials, and this attitude has been observed to be the same for both communities. This result is also supported in that there is no meaningful explanation of means between extrinsic and intrinsic motivations for recycling among householders in Squatters and Low-cost Flats. But, the economic reason means (to receive payment for materials recycled) are greatest in importance for both communities (squatter: 4.74 versus low-cost flat: 4.56) compared to all other extrinsic and intrinsic reasons means.

Motivations for Environmentally Sound Solid Waste Management

The interesting finding of this study is that the householders are significantly more strongly motivated by economic reasons to practice environmentally sound solid waste

Table 3 Reasons for Households Not Collecting and Recycling Waste Materials within Individual Areas.

Reason	*Jinjang Utara*	*Sentul*	*Datuk Keramat*	*Total*
	Percent			
Don't yet know about recycling	0.0	23.9	14.3	16.6 **
No recycling program here	0.0	6.9	52.7	29.1 ***
Not interested in recycling	78.9	41.7	51.6	50.5 **
Don't have enough time to sort, save and transport materials	100.0	54.2	90.1	76.9 ***
Don't have enough room in my home to store materials	68.4	52.8	91.2	73.6 ***
Recycling collection point is too far away	0.0	41.7	44.0	38.5 ***
Not satisfied with the current recycling program	0.0	13.9	48.4	29.7 ***
No buyer for or place to sell recycled materials	0.0	54.2	47.3	45.1 ***
Recycling program is not mandatory	0.0	0.0	73.6	36.8 ***
Other reasons	31.6	0.0	2.2	4.4 ***

Note:

1. *** Indicates significant difference among areas at 0.01 level.
2. ** Indicates significant difference among areas at 0.05 level.

management. This finding is supported in that the means for economic reasons, for which householders practice environmentally sound solid waste management, such as sell the waste to an "itinerant" buyer ($P < 0.01$), have practice of collecting and recycling waste materials ($P < 0.01$), separate waste materials in order to their kinds ($P < 0.05$), reuse waste materials ($P < 0.05$), and source-reduce of waste ($P \geq 0.10$) are significantly greater for the householders with low level of income. Moreover, the means for the above-mentioned economic reasons are significantly greater ($P < 0.01$) for the householders with low level of education. In different education levels of the householders, the reason "separate waste materials in order to their kinds" is highly significant ($P < 0.01$). These findings imply that the householders with low levels of income and education are strongly motivated to practice environmentally sound solid waste management. This occurs due to the fact that economic hardship of the low-income people forces them to do so. Hence it can be certainly argued that poverty or economic inability does not cause environmental degradation, particularly in household solid waste management.

Householders' "Behaviour" Concerning Solid Waste Management

Quantity of Households Waste Generation

All the households covered in the survey generate, every three days, an average of 5.66 kilograms of waste. Of all respondents, the following percentages generate the following quantity every three days: 28.3 percent up to 4.00 kilograms, 46.0 percent from 5.0 to 6.0 kilograms, 12.6 percent from 7.0 to 8.0 kilograms, 11.7 percent 10.0 kilograms, and 1.3 percent from 12.0 to 15.0 kilograms. The quantity of waste generation differs significantly among areas ($P < 0.01$), with the highest average was reported in Sentul (6.92 kilograms), followed by 5.83 kilograms in Jinjang Utara, and 4.22 kilograms in Datuk Keramat.

Table 4 Personal and Social Reasons for Recycling for Households in Squatters Versus in Low-Cost Flats.

Personal and Social Reason	*Squatter*	*Low-cost Flat*	*Total*
		Mean Score[a]	
Personal			
Improve appearance of my area	1.84	1.79	1.82 [NS]
I feel good because I have done something to improve my community and the environment	1.38	2.23	1.69 [***]
My religion tells me to use resources carefully	1.28	1.58	1.39 [NS]
Encouraged by members of my family	1.57	2.72	1.98 [***]
Social pressure from members of my family	1.25	1.93	1.50 [***]
To receive payment for materials recycled	4.74	4.56	4.67 [NS]
Personal Reasons Means	2.01	2.47	2.18 [**]
Social			
Protect the environment	1.52	2.51	1.88 [***]
Protect human health	1.52	2.61	1.92 [***]
Avoid waste	2.07	3.14	2.45 [***]
Reduce total amount of waste that has to be burned or placed in sanitary landfills (dumpsites)	2.86	2.09	2.58 [**]
Reduce costs of waste collection and disposal	1.50	2.33	1.80 [***]
Social pressure from neighbours	1.24	1.00	1.15 [NS]
Encouragement from neighbours	1.24	1.00	1.15 [NS]
Social Reasons Means	1.83	2.23	1.97 [***]

Note:

1. [a] Indicates mean scores of relative importance, where 1 = Not very important, 2 = Not important, 3 = Medium important, 4 = Important and, 5 = Very important.
2. [***] Indicates significant difference among means at 0.01 level.
3. [**] Indicates significant difference among means at 0.05 level.
4. [NS] Indicates not significant at 0.10 level.

Length of Time Waste is Stored in the House

More than seventy-four percent of all householders reported that they are storing household waste in their homes for 1-2 days before placing it outside for collection, 18.3 percent for as long as 3-4 days, and 2.0 percent for as long as 5-7 days. More than seven percent of all householders reported placing their waste at kerbside on the day it is generated, rather than storing it inside their homes for later disposal. Compared to Jinjang Utara and Datuk Keramat, significantly ($P < 0.01$) more householders in Sentul are storing their waste in their homes for 1-2 days before placing it outside for collection (87.0 percent versus 79.0 percent and 57.0 percent) and significantly ($P < 0.01$) fewer householders in Jinjang Utara store their waste for 3-4 days compared to Datuk Keramat and Sentul (6.0 percent versus 39.0 percent and 10.0 percent). In Jinjang Utara, significantly ($P < 0.01$) more householders place their waste at kerbside on the day it is generated (15.0 percent), followed by fewer percentages are 6.0 percent in Datuk Keramat and 1.0 percent in Sentul. No households in Jinjang Utara reported that they are storing their waste for 5-7 days before placing it outside for collection and this length of time does not differ significantly among areas ($P \geq 0.10$).

Method of Source Reduction

Of the 28 surveyed households who have practiced "source-reduction" of wastes, the most common methods for "source-reduction" are reusing waste materials (92.9 percent) and repairing and reusing things that are damaged (85.7 percent). Other methods of "source-reduction" all involve considerations by householders when deciding whether to buy particular products. The most important such consideration is the durability of the product (57.1 percent), followed by whether the products' package can be reused (50.0 percent), possibilities for reusing the products (28.6 percent), amount of packaging included with the products (17.9 percent), and whether the products are made from renewable resources (17.9 percent). Except for the third, fourth, and fifth above-mentioned methods, percentages of householders for all other methods differ significantly among areas ($P < 0.01$).

Ways of Reusing Waste Materials

The following percentages of households reported that they are reusing materials, that otherwise would be disposed as waste, in the following ways: nearly 86.0 percent of households repair used materials, 83.0 percent use materials for a different purpose, 63.0 percent sell used materials for reuse or to others, and nearly 42.0 percent of households give used materials to other people. All the above-mentioned methods of reusing waste materials differ significantly among areas ($P < 0.01$, except for the latter way, which is significant at "$P < 0.05$" level), with above-average percentages of households in both Jinjang Utara and Sentul have been repairing used materials (92.0 percent), in Datuk Keramat giving used materials to other people (45.0 percent), in Jinjang Utara selling used materials to others (100.0 percent), giving used materials to other people (50.0 percent), and using materials themselves for a different purpose (96.0 percent).

Length of Time of Recycling Waste Materials

Of the one hundred nineteen householders who recycle, 58.0 percent have been doing so for more than one year, 13.0 percent for six months to one year, 5.0 percent for one to six months, and more than 23.0 percent respondents indicated that they cannot remember the length of time of recycling the waste materials. Length of time of recycling differs significantly among areas ($P < 0.01$), with householders in Jinjang Utara being the most "seasoned" recyclers and those in Sentul being the most recent to recycle. A significant number of householders, who recycle, indicated that they could not remember the length of time of recycling waste materials.

Incidence of Waste Materials Recycling

Of the all recyclers, 91.0 percent recycle newspapers, 80.0 percent tin, 79.0 percent aluminium, 30.0 percent plastic, 25.0 percent glass, and 8.0 percent papers. In addition, 36.0 percent of recyclers indicated that they recycle "other materials". Among the other materials, leather items are significant and the percentage of recyclers that recycle such item is limited to Jinjang Utara (53.0 percent) ($P < 0.01$). The percentages of householders recycling various waste materials in different areas differ significantly ($P < 0.01$), except for the first and fifth above-mentioned items, which are not statistically significant ($P \geq 0.10$).

Disposition of Recycled Materials

Of the all recyclers, 97.0 percent sell their recycled materials to itinerant buyers who come to their homes, 6.0 percent take them to public recycling collection centres, 2.0

percent place them in their own dust-bins, and 1.0 percent gives them to their children who take them to school for recycling. Outside the above-mentioned dispositions of recycled materials, 10.0 percent indicated that they have "other purposes" with their recycled materials. Among the other purposes, "recyclers take their particular recycled materials to a nearest recycling shop for selling them in a reasonable price" is important. All the above-mentioned percentages differ significantly among areas ($P < 0.01$, $P < 0.05$).

CONCLUSION

In regard to solid waste generation, the study shows that urban poor and low-income groups usually generate a small amount of waste per person. This study also shows that the urban poor and low-income groups play a very positive role from a sound environmental perspective, as they are the main reusers, recyclers, and source-reducers of solid wastes. This finding is indeed crucial as it runs against the widely voiced assertion in the literature that the poor contribute for much more to degrading the environment in relation to the better-off. Such a finding, which set itself apart from the general theme in the literature, is indeed significant to sound environmental policy making, which does not unnecessarily militate against the poor. Moreover, the satisfactory behaviour pattern as ascribing to poor households is explainable upon reference to the tendency of the poor to explore and exploit income generation or saving activities and ventures. It seems plausible to make the assertion that solid waste management is quite a potential arena for capturing income generation and saving activities as a means of augmenting relatively poorer households' income. In fact, analysis of knowledge, attitude, and behaviour of the urban poor and low-income groups concerning solid waste management gives evidence to the effect that neither reduction of poverty shall improve environmental quality nor improvement of environmental conditions would result in reduction of poverty. Being it the case, policies should be formulated to focus on promoting education and skills of the urban poor together with empowering them as a means of promoting their quality of lifestyles. In addition, policies for sustainable urban growth need to be adopted that could be realistically able to view each urban environmental problem relating to all other urban issues thereby creating a habitat, which makes city living attractive to all groups.

As stated by the UNCHS (1988) and WCED (1987), poverty and environment are often seen as inextricably linked, with the need to eradicate poverty as an initial step to protecting environment. The present study concludes against this belief, and instead proposes that the problems of poverty and environment need to be seen differently as the causal relationship between the two does actually depend on the level of socioeconomic profile and the type of environmental practices of a particular group of community. The study shows that there is no evidence of urban poverty being a significant contributor to environmental degradation. The environmental problems exist among the urban squatters and low-income communities are associated with inadequate provision for water, sanitation, drainage, waste collection, and health care. These environmental problems can be greatly reduced by undertaking developmental projects and better provisions of infrastructures.

BIOGRAPHY

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REFERENCES

Durning, A.B. (1989). 'Poverty and the Environment: Reversing the Downward Spiral', World Watch Paper No. 92, World Watch Institute, Washington, D.C.

Hardoy, J.E., Cairncross, S. & Satterthwaite, D. (1990). 'The Urban Context', In: J.E., Hardoy, S. Cairncross & D. Satterthwaite (Eds.), The Poor Die Young: Housing and Health in Third World Cities, Earthscan Publications, London.

Holmberg, J. & Thompson, K. (1991). 'Poverty, Environment and Development: A Discussion Paper'. Draft Paper Prepared for UNDP/NGO UNCED Working Group Meeting in International Institute for Environment and Development (IIED), Geneva.

Jalal, K.F. (1993). 'Sustainable Development, Environment and Poverty Nexus', Occasional Paper No. 7 Asian Development Bank, Manila.

Leach, M. & Mearns, R. (1995). 'Poverty and Environment in Developing Countries: An Overview Study', Institute for Development Studies, Brighton.

Mueller, C.C. (1993). 'Environmental problems inherent to a development style: degradation and poverty in Brazil', Environment and Urbanization Vol. 7, No. 2, pp. 67-84.

Omuta, G.E.D. (1988). 'Poverty and the Urban Environment: An Examination of the Role of Income Levels in Sapele, Nigeria', Butterworth & Co Publishers Ltd., London.

Prakash, S. (1997). 'Poverty and Environment Linkages in Mountains and Uplands: Reflections on the "Poverty Trap" Thesis', CREED Working Paper No 12, The Center for Research in Experimental Economics and Political Decision-making, Amsterdam.

Ramphal, S. (1992). 'Our Country, the Planet: Forging a Partnership for Survival', Cahners Business Information, Inc., New York.

UNCHS. (1988). 'Refuse Collection Vehicles for Developing Countries', United Nations Commissioner for Human Settlement, New York.

WCED. (1987). 'Our Common Future: The Brundtland Report', Oxford University Press/World Commission on Environment and Development, New York.